

Light scattering by ultrasonically levitated particles: system design

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We present the design of a scatterometer for accurate measuring of the full angular Mueller matrix profile of mm- to μm -sized samples held in place by sound. The aim of this project is to enable research on single particles of highly valuable materials in a non-contact and controlled manner. The scatterometer comprises a tunable multimode Argon-krypton laser, with 12 wavelengths in visible range, linear polarizers, a reference photomultiplier tube (PMT) for monitoring the laser beam intensity, and one or 14 PMTs mounted radially towards the sample at an adjustable radius. The measurement angle is controlled by a motor-driven rotational stage with an accuracy of $15'$ [1]. The system is entirely implemented using LabVIEW, including the FPGA-based data acquisition and the instrument's user interface. The built-in FPGA allows for data transfer as well as efficient data processing in the case of using multiple channels, which is our next step.

References

- [1] Maconi, G., Penttilä, A., Kassamakov, I., Gritsevich, M., Helander, P., Puranen, T., Salmi, A., Hæggström, E., and Muinonen, K., 2018: Non-destructive controlled single-particle light scattering measurement, *J. Quant. Spectrosc. Radiat. Transfer* **204**, 159–164.

Preferred mode of presentation: Oral